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Validation of five *Peronospora* species names

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Abstract—Some *Peronospora* names included in the last major taxonomic treatment (a 1991 annotated list of names) were invalid because the author failed to provide the Latin description required at the time of their proposal. Here five such names—*Peronospora coronillae-minimae*, *P. erini*, *P. papaveris-pilosi*, *P. ranunculi-flabellati*, and *P. viciicola*—are validated either by providing an English description or by reference to the original English description.

Key words—biodiversity, downy mildew, *Peronosporaceae*, *Peronosporales*, plant pathogens

Introduction

Peronospora (*Oomycota*, *Peronosporales*, *Peronosporaceae*) is a species-rich genus of biotrophic plant pathogens that cause downy mildew diseases (Constantinescu 1991, Thines & Choi 2016, Salgado-Salazar & al. 2018). It is also a nomenclaturally and taxonomically complicated genus (Shaw 1981, Skalický 1983, Constantinescu 1991). Broadly, there are two approaches to describing species in *Peronosporaceae*. One approach applies a broad species concept, with one species of *Peronospora* infecting many hosts within a single plant family. The other approach applies a narrow species concept, with species having narrow host specificity (Skalický 1983, Constantinescu 1991). Molecular phylogenetic research seems to validate the application of a narrow species concept (e.g., Thines & Choi 2016), even though the morphology of phylogenetically distinct species may overlap (e.g., García-Blázquez & al. 2008; Petrželová & al. 2017).

Constantinescu (1991) provides the most comprehensive list of *Peronospora* names and is an invaluable resource to those studying the genus. In his list, Constantinescu (1991) included many names that were invalidly published because the describing author failed to clearly designate a holotype specimen. Examples include several *Peronospora* taxa described by Gaponenko (1972), who did not designate individual type specimens, that have been recently validated by Thines (2019). Other names are invalid because the describing authors did not provide a description in Latin, which was required by the nomenclatural code in effect at the time of publication (Constantinescu 1991). The aim of this paper is to validate *Peronospora coronillae-minimae*, *P. erini*, *P. papaveris-pilosi*, *P. ranunculi-flabellati*, and *P. viciicola,* for which holotypes were designated but a Latin description was not provided. Here an English description is provided as allowed by the most recent International Code of Nomenclature for algae, fungi, and plants (Turland & al. 2018).

Taxonomy

Peronospora coronillae-minimae Vienn.-Bourg. ex W.J. Davis & J.A. Crouch, **sp. nov.**

MB 838139

"*Peronospora coronillae-minimae*" Vienn.-Bourg., Bull. Soc. Mycol. France 69: 332. 1954 [nom. inval., ICN (Shenzhen) Art. 39.1]

Conidiophores in scattered tufts on abaxial side of *Coronilla minima* leaves, emerging in clusters of 3–6, 160–200 µm long with a cylindrical or clavate trunk 8–10 µm thick. Sterigmata forming at an obtuse angle. Conidia subhyaline to pale yellow, ellipsoid, 19–32 × 16–28 µm (average: 25 × 21 µm). Oospores numerous, pale yellow, smooth wall 2.5 µm thick, 25–36 × 23–34 µm.

Type: France, Seine-et-Oise, near Ferté-Allais, *Coronilla minima* L., May 1952, G. Viennot-Bourgin, (**Holotype**, PC).

Peronospora erini Vienn.-Bourg. ex W.J. Davis & J.A. Crouch, **sp. nov.**

MB 838140

"*Peronospora erini*" Vienn.-Bourg., Bull. Soc. Mycol. France 69: 334. 1954. [nom. inval., ICN (Shenzhen) Art. 39.1]

Conidiophores scattered, hydrophilic, on margin of yellowing leaves, grayish, ragged, 80–130 µm long, 6.9 µm diam., branching in upper 1/2 to 1/3;

ultimate branchlets contracted. Conidia grey, ellipsoid, slightly apical, 12–31 × 12–21 µm (average: 24.2 × 17.5 µm). Oospores unknown.

Type: France, Hautes-Pyrénées, Cirque de Gavarnie, small bog, *Erinus alpinus* L., August 1952, G. Viennot-Bourgin (**Holotype**, PC).

Peronospora papaveris-pilosi Vienn.-Bourg. ex W.J. Davis & J.A. Crouch, **sp. nov.**

MB 838141

"*Peronospora papaveris-pilosi*" Vienn.-Bourg., Bull. Soc. Mycol. France 69: 335. 1954. [nom. inval., ICN (Shenzhen) Art. 39.1]

Forming angular, yellow–brown spots (confined by veins on *Papaver pilosum* leaves), 4.2 mm diam. Mycelium homogenous, dense, brownish, on abaxial side of the spots. Conidiophores erect, 300–400 µm long, divided, branched in upper half. Secondary branches bearing moderate to few divisions. Sterigmata forming at an acute angle. Conidia ellipsoid or globose, pale brown, 15–35 × 13–24 µm (average: 25.5 × 21.4 µm). Oospores unknown.

Type—France, Seine-et-Oise, Grignon Botanical Garden, *Papaver pilosum* Sm., April 1931, G. Viennot-Bourgin (**Holotype**, PC).

Peronospora ranunculi-flabellati Vienn.-Bourg. ex W.J. Davis & J.A. Crouch, **sp. nov.**

MB 838142

"*Peronospora ranunculi-flabellati*" Vienn.-Bourg., Bull. Soc. Mycol. France 69: 335. 1954. [nom. inval., ICN (Shenzhen) Art. 39.1]

Mycelium dense, grayish brown on abaxial side of *Ranunculus paludosus* leaves. Conidiophores variable, 300–450 µm long, branching slightly below upper half. Secondary branches distinct, flexible, branching dichotomously 1–2 times. Sterigmata short and acute. Conidia grayish brown, averaging 19 × 17.4 µm. Oospores numerous, yellowish walls, slightly pleated, 20–25 µm diam.

Type: France, Seine-et-Oise, Grignon Botanical Garden, *Ranunculus chaerophyllos* [redet. as *R. paludosus*], May 1937, G. Viennot-Bourgin (**Holotype**, PC).

Peronospora viciicola L. Camp. ex W.J. Davis & J.A. Crouch, **sp. nov.**

MB 838143

"*Peronospora viciicola*" L. Camp. [as '*vicicola*'], Bull. Wash. State Agric. Exp. Sta. 318: 18. 1935. [nom. inval., ICN (Shenzhen) Art. 39.1]

English description provided in Campbell (1935: 18).

Type: United States of America, Washington, Steamboat Rock, *Vicia gigentea* Hook. [≡ *V. nigricans* subsp. *gigantea* (Hook.) Lassetter & C.R. Gunn], 7 September 1934, L. Campbell (**Holotype**, WSP 16631).

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